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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/887,394	06/22/2001	Yifan Gong	TI-30867	7151

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EXAMINER
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STORM, DONALD L

ART UNIT	PAPER NUMBER
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2654

DATE MAILED: 02/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/887,394

Applicant(s)

GONG, YIFAN

Examiner

Donald L. Storm

Art Unit

2654

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on June 22, 2001 through July 21, 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 7/21/03.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Response to Amendment*

1. The PRELIMINARY AMENDMENT, filed June 22, 2001, is present in the application file, and it has been considered by the Examiner.

### *Specification*

2. The specification is objected to because the symbol "Eq-3" (page 7, line 19), the symbol Eq-2 (page 8, line 17), the symbol Eq-10 (page 8, line 23), the symbol "equation 4" (page 9, line 25), and the symbol "equation 10" (page 9, line 26) are not defined close to the location of first use. See 37 CFR 1.71 and MPEP 608.01. Appropriate correction is required. To preclude an objection for adding new matter to the specification, the Applicant should point out specific support in the disclosure as filed for any added definition.

3. The Examiner notes, without objection, the possibility of informalities in the specification. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. The Applicant's cooperation is requested to consider correcting minor errors of which the Applicant may become aware during normal review and revision of the disclosure.

a. Page 5, lines 6-7, implies a relationship between the size of the boxes in Fig. 2 and the number transformations per step. The boxes seem to be the same size, but the numbers of transformation steps seem to vary. Is this representation as the Applicant intended?

b. At page 4, lines 9-10, the symbol  $m(\omega)$  is introduced to represent the number of acoustic vectors. However, at page 1, line 22, the symbol  $m$  seems to be used as index for

identifying steps in model iteration. Are these two uses of  $m$  related? Is confusion introduced by using the same symbol to represent different quantities? Should there be a comma between  $\alpha$  and  $i$ ? Then at line 29, the symbol  $m(\xi, i)$  is used without further definition. Is this usage related to one or the other prior usages of  $m$ , or perhaps somehow related to both usages?

### ***Claim Informalities***

4. Claim 1, and by dependency claim 2, are objected under 37 CFR 1.75(a) to because the scope must be interpreted when the symbols making up the claim limitations are not defined in the claim. The symbol "HMM" (multiple occurrences) should be defined in the claims at least the first time used, if a concise and accurate definition is available.
5. Claim 2 is objected under 37 CFR 1.75(a) to because the scope must be interpreted when the symbols making up the claim limitations are not defined in the claim. The symbol "EM" (page 10, line 7) should be defined in the claims at least the first time used, if a concise and accurate definition is available.
6. Claim 1, and by dependency claim 2, are objected to under 37 CFR 1.75(a) because the meaning of the phrase "the initial HMM models" (page 10, line 5) needs clarification. Because no initial HMM models were previously recited, it may be unclear as to what element this phrase refers. To further timely prosecution and evaluate prior art, the Examiner has interpreted this phrase to refer to --initial HMM models--.

7. Claim 3, and by dependency claim 4, are objected under 37 CFR 1.75(a) to because the scope must be interpreted when the symbols making up the claim limitations are not defined in the claim. The symbol “HMM” (multiple occurrences) should be defined in the claims at least the first time used, if a concise and accurate definition is available.

8. Claim 3, and by dependency claim 4, are objected to because usage of the term “recognizer” (page 10, line 10) as the sole apparatus operable to achieve the functionality of the further claim elements is not in accord with the meaning normally given to that term by artisans. An artisan would expect a recognizer to recognize. The sole, recited functionality that the claimed recognizer achieves is obtaining the adapted models. The recognizer described by the claim is directed solely toward obtaining. The means and functionality that normally define a recognizer are not related by the claim to the functionality of obtaining. It may be confusing to claim a known device, but to set the device to accomplish only a functionality that is unrelated to its normal functioning.

The rule that the Applicant can act as his own lexicographer to specifically define terms of claim contrary to their ordinary meaning does not apply if written description does not so clearly define the term so as to put reasonable competitor, or one reasonably skilled in the art, on notice that patentee intended to so redefine that term.

9. Claim 4 is objected under 37 CFR 1.75(a) to because the scope must be interpreted when the symbols making up the claim limitations are not defined in the claim. The symbol “EM” (page 10, line 13) should be defined in the claims at least the first time used, if a concise and accurate definition is available.

10. The Examiner notes, without objection, that the preamble in claims 1-4 does not limit the claims since none of the phrases in the preamble are necessary to define the invention, since the preamble is not essential to understanding of limitations or terms in claim body, and since deletion of preamble phrases would not change the structural definition or operation of the body of the claims.

11. The Examiner notes, without objection, that the form of the claims does not follow Office practice. While there is no set statutory form for claims, the present Office practice is to insist that each claim must be the object of a sentence starting with "I (or we) claim", "The invention claimed is", or the equivalent. The Applicant is encouraged to insert a desired introduction before claim 1. If, at the time of allowance, appropriate terminology is not present, it is inserted by the technical staff. See MPEP § 608.01(m).

***Claim Rejections - 35 USC § 112***

12. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

13. Claims 3-4 rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

A single means claim, i.e., where a means recitation does not appear in combination with another recited element of means, is subject to rejection under 35 U.S.C. 112, first paragraph, as being of broader scope than can be adequately enabled by the disclosure. *In re Hyatt*, 708 F.2d 712, 714-715, 218 USPQ 195, 197 (Fed. Cir. 1983).

Claims 3-4 cover only one element providing means, namely a recognizer, which covers every conceivable means for achieving a recognizer. HMM models are recited as data or abstract mathematical constructions, being obtained by the recognizer. Transforms are recited as data or abstract mathematical constructions, being used by the recognizer. Only the sole recognizer is recited in the claim as providing functionality.

While possibly being enabling for any recognizer that an artisan may be able to find today, the disclosure does not reasonably provide enablement for all other recognizers. At most, only those recognizers known to the Applicant are enabled by the Applicant's disclosure. For example, the disclosure does not enable the claim for all future recognizers, unknown to anyone at the time of the Applicant's invention.

### ***Claim Rejections - 35 USC § 102***

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

#### **Gong and Godfrey**

15. Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Gong, Y. and John J. Godfrey, "Transforming HMMs for Speaker-Independent Hands-Free Speech

Recognition in the Car,” Proc. Acoust., Speech, and Sig. Proc., 1999 ICASSP ’99, 15-19 March 1999, vol. 1, pp. 297-300 (Gong and Godfrey).

16. Regarding claim 1, Gong and Godfrey describes:

providing HMM models [at page 297, column 2, as given an initial set of HMMs];

they are for adaptation to a new acoustic environment [at page 298, column 1, as train HMMs for the target environment];

obtain adapted new models directly for initial HMM models using a single set of transformations [at page 298, column 1, step 2.3.2, as  $H \leftarrow \Phi_c(H)$ ].

17. Regarding claim 3, Gong and Godfrey describes:

adapted HMM models obtained directly from initial HMM models using a single set of transformations [at page 298, column 1, steps 1. to 2.3.2, as HMMs  $H \leftarrow \Phi_c(H)$ ];

a recognizer including them [at section 3.3, as the recognizer with one unique linear transformation].

### ***Claim Rejections - 35 USC § 103***

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.



Gong and Godfrey and Afify et al.

19. Claims 2 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gong, Y. and John J. Godfrey, "Transforming HMMs for Speaker-Independent Hands-Free Speech Recognition in the Car," Proc. 1999 IEEE Int. Conf. on Acoust., Speech, and Sig. Proc., 1999 ICASSP '99, 15-19 March 1999, vol. 1, pp. 297-300 (Gong and Godfrey) in view of Afify, Mohamed, Yifan Gong, and Jean-Paul Haton, "A Unified Maximum Likelihood Approach to Acoustic Mismatch Compensation: Application to Noisy Lombard Speech Recognition," Proc. 1997 IEEE Int. Conf. on Acoust., Speech, and Sig. Proc., 1997 ICASSP-97, 21-24 April 1997, vol. 2, pp. 839-842 (Afify et al.).

20. Claim 2 includes the limitations of claim 1. Gong and Godfrey describes those limitations as indicated there. Gong and Godfrey [at page 298, column 2] describes updating the HMMs using the new transformation; however, details of applying the transformation are not provided.

In particular, Gong and Godfrey does not explicitly describe EM estimations and alignment iterations.

Like Gong and Godfrey, Afify et al. [at page 839, column 2] describes adapting HMM models to a new environment using minimal training data from the new environment, and Afify et al. describes:

transformation accumulation [at Eqs. (11), (12), (18), (19), and page 841, column 2, step 4, as estimate bias parameters for model];

the accumulation between alignment iterations [at page 841, column 2, steps 3-4, as estimate for a training sample after forward backward algorithm, for each training sample];

and performing it between estimations [at Eqs. (15), (16), and page 841, column 2, steps 3-4, as estimate for a training sample after calculating expected values, for each training sample];

the estimations are EM estimations [at page 840, column 2, as the expected values can be calculated using the forward backward algorithm by EM algorithm iteratively].

As indicated, Afify et al. shows that transformation accumulation between iterative EM estimations and alignment was known to artisans at the time of invention. Since Afify et al. [at page 840, column 2] also point out that the iterative EM estimations and alignment has the advantage of ensuring the increase of the observed data likelihood, it would have been obvious to one of ordinary skill in the art of HMM adaptation at the time of invention to include the concepts described by Afify et al. at least transformation accumulation between iterative EM estimations and alignment to provide the details for applying Gong and Godfrey's transformation because it ensures an iterative increase of the observed data likelihood.

21. Claim 4 sets forth additional limitations similar to limitations set forth in claim 2. Gong and Godfrey and Afify et al. describe and make obvious the additional limitations as indicated there.

### ***Conclusion***

22. The following references here made of record are considered pertinent to applicant's disclosure:

Potamianos et al. [US Patent 5,930,753] performs a single linear transform on an original set of HMMs within a maximum likelihood determination to adapt them for recognition..

Netsch [US Patent 6,003,002] performs a single affine transformation on HMMs to adapt them to a new environment for recognition.

Iso [US Patent 6,253,180] performs a single transform on an original set of HMMs to adapt them for speaker recognition..

23. Any response to this action should be mailed to:

**Mail Stop Amendment**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**or faxed to:**

(703) 872-9306, (for formal communications intended for entry)

**Or:**

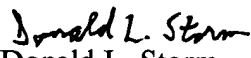
(703) 872-9306, (for informal or draft communications, and please label "PROPOSED" or "DRAFT")

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24. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donald L. Storm, of Art Unit 2654, whose telephone number is (703) 305-3941. The examiner can normally be reached on weekdays between 8:00 AM and 4:30 PM Eastern Time. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on (703) 305-9645.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Inquiries regarding the status of submissions relating to an application or questions on the Private PAIR system should be directed to the Electronic Business Center (EBC) at 866-217-9197 (toll-free) or 703-305-3028 between the hours of 6 a.m. and midnight Monday through Friday EST, or by e-mail at: [ebc@uspto.gov](mailto:ebc@uspto.gov). For general information about the PAIR system, see <http://pair-direct.uspto.gov>.

February 7, 2005

  
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Art Unit 2654